REMARKS/ARGUMENTS

Claims 1-53 are present in the application.

Claims 1-11 are rejected as unpatentable over YAMAZAKI et al. 6,489,632 in view of MURAKAMI et al. U.S. 2003/0057419, further in view of YAMAZAKI et al. 6,589,822, further in view of KANEKO et al. 6,433,842 and still further in view of OHKAWARA et al. 6,504,585. This rejection is respectfully traversed.

Claim 1 of the present application provides that gate electrodes of the thin film transistors have a first multi-level conductive structure and that scan lines connected to the corresponding gate electrodes have the first multi-level conductive structure. Claim 11 further provides that the first multi-level conductive structure includes a TiN film located at a top of the structure, an Al-based film located below the TiN film, and at least one Ti film located at at least one of an upper position and a lower position with respect to the Al-based film. Claim 1 also provides that the TiN film of the first multi-level conductive structure has a nitrogen concentration of 25 atomic % or higher.

By way of example, Figure 2A of the present application shows gate electrode 15 of thin film transistor (TFT) 14. Figure 2A also shows scan line 11 connected to the gate electrode 15. Both the gate electrode 15 and the scan line 11 have a first multi-level conductive structure. Figure 2B of the present

application shows an example of a first multi-level conductive structure. Specifically, Figure 2B shows a TiN film 103 at a top of the structure, an Al-based film 101 below the TiN film and a Ti film 102 between the Al film 101 and the TiN film 103 such that the Ti film is located at an upper position with respect to the Al-based film. Page 29, lines 4-8 of the present application disclose that TiN film 103 has a nitrogen concentration of 25 atomic % or higher.

The Official Action offers YAMAZAKI et al. '632 as teaching a semiconductor device having a gate oxide film where impurity regions are selectively formed on a semiconductor substrate and are activated by radiating laser beams. While the reference appears to teach that for which it is offered, it does not appear relevant to what is recited in claim 1 of the present application. Further clarification of the relevancy of YAMAZAKI et al. '632 with respect to claim 1 is respectfully requested.

In any event, the Official Action notes that YAMAZAKI et al. '632 fail to disclose the recited nitrogen concentration, the multi-layer structure, the scanning line structure and common line structures. The various secondary references are combined with YAMAZAKI et al. '632 in an attempt to overcome these shortcomings.

MURAKAMI et al. is cited for the teaching of the recited nitrogen concentration. As set forth above, claim 1

recites that a TiN film of a first multi-level conductive structure has a nitrogen concentration of 25 atomic % or higher.

Applicants have very carefully studied MURAKAMI et al. and discern only one reference to titanium nitride in paragraph [0101]. However, this teaching refers to a nitrated valve metal film which in paragraph [0102] is used to allow a cathode current to flow but does not allow an anode current to flow. Accordingly, such teaching is with respect to the structure of a capacitor. Further clarification of how one of ordinary skill in the art would use this teaching to render obvious the gate electrode and scan lines of the present application are further requested.

In addition, upon further review of MURAKAMI et al. it appears that the only reference to a nitrogen concentration of at least 25 atomic % is in paragraph [0130]. However, this passage refers to a nitrated silicon oxide film 302*a*, whereas the recited film of the present invention is a TiN (titanium nitride) film. Further clarification of how a nitrated silicon oxide film would render obvious a titanium nitride film is respectfully requested.

YAMAZAKI et al. '822 is cited for the teaching of a top-gate type and bottom-gate type thin film transistor having the recited multi-layer structure. This reference does not appear to teach that for which it is offered. As set forth above, the first multi-level conductive structure of claim 1

includes a TiN film located on a top of the structure, an Al-based film located below the TiN film and at least one Ti film located at at least one of an upper position and a lower position with respect to the Al-based film.

YAMAZAKI et al. '822 at column 6, lines 43-48 disclose that a gate electrode 306, a source electrode 307 and a drain electrode 308 are formed with a metal material such as aluminum or a multi-layer film of aluminum and titanium nitride. Neither this passage nor any other passage of YAMAZAKI et al. '822 teaches at least one Ti film located at at least one of an upper position and a lower position with respect to an Al-based film or that the TiN film is located at the top of the structure. In fact, claims 3 and 6 of YAMAZAKI et al. '822 disclose that the gate electrode has a multi-layer structure comprising a first layer comprising titanium nitride and a second layer comprising aluminum. Accordingly, the titanium nitride layer would be formed first and then the aluminum would be formed over the titanium nitride which directly teaches away from what is recited in claim 1 of the present application.

KANEKO et al. is cited for the teaching of a scanning line. As set forth above, claim 1 provides that the scan lines are connected to the corresponding gate electrodes and have the first multi-level conductive structure.

Column 1, lines 49-57 of KANEKO et al. with reference to Figure 7 teach that reference numeral 2A denotes a gate line, 3A denotes a drain line, 3B denotes a drain line, and 3C denotes a source electrode. Drain line 3A, drain electrode 3B and source electrodes 3C are composed of the same layered structure. It appears that since drain line 3A is horizontal and the scan lines 11 of the present application are horizontal, the drain lines 3A of KANEKO et al. may be scan lines. However, drain lines 3A neither have the same multi-layer structure as the gate lines nor have a multi-level conductive structure including TiN, Al and Ti as recited in claim 1 of the present application.

OHKAWARA et al. is cited for the teaching of the recited common line. The common line is not recited until claim 2 which depends from claim 1. Accordingly, it does not appear that OHKAWARA et al. is relevant to claim 1. In any event, claim 2 recites that the common electrodes and the common lines have a second multi-level structure including a TiN film located at a top of the structure, an Al-based film located below the TiN film and at least one Ti film located at at least one of an upper position and a lower position with respect to the Al-based film. Applicants are unable to find such structure in OKHAWARA et al. and thus this reference does not disclose that for which it is offered.

The above-noted features are missing from each of the references, are absent from the combination, and thus are not obvious to one having ordinary skill in the art. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

Claims 12-21 are rejected as unpatentable over YAMAZAKI et al. '632 in view of YAMAZAKI et al. 6,583,471 and further in view of YAMAZAKI et al. '822 and further in view of KANEKO et al. and still further in view of OHKAWARA et al. This rejection is respectfully traversed.

Claim 12 also provides that a first multi-level conductive structure includes a TiN film located at a top of the structure, and an Al-based film located below the TiN film, and at least one Ti film located at at least one of an upper position and a lower position with respect to the Al-based film. The rejection of claims 12-21 appears similar to that of claims 1-11 except that YAMAZAKI et al. '471 is used in place of MURAKAMI et al. Accordingly, the comments above regarding YAMAZAKI et al. '632, YAMAZAKI et al. '822, KANEKO et al. and OKHAWARA et al. are equally applicable to claims 12-21.

YAMAZAKI et al. '471 is offered for the teaching of the recited nitrogen concentration. However, applicants have thoroughly reviewed the disclosure of YAMAZAKI et al. '471 and are unable to discern a passage or passages that disclose that a

TiN film of a first multi-level conductive structure has a nitrogen concentration of 25 atomic % or higher as recited in claim 12 of the present application. Specifically, column 8, lines 41-49 of YAMAZAKI et al. '471 disclose that a silicon oxide film, a silicon nitride film, and a silicon nitride oxide film can be used as an insulating film. The silicon nitride oxide film can be formed by a raw material gas of SiH_4, N_2O, and NH3. Preferably, the concentration of nitrogen contained therein is from 25 atomic % to less than 50 atomic %. Applicants request further clarification of how the silicon nitride oxide film of YAMAZAKI et al. '471 would lead one of ordinary skill in the art to use the titanium nitride film as recited in claim 12 of the present application.

In addition, the titanium nitride film as recited in claim 12 is part of a multi-level conductive structure that also includes aluminum and titanium. Column 11, lines 57-67 of YAMAZAKI et al. '471 disclose a two-layer gate wiring having first and second conductive films 123, 124 made of titanium or a compound largely composed of titanium such as titanium nitride. The alternative elements taught by YAMAZAKI et al. are tantalum, titanium, molybdenum, tungsten, chrome and silicon. YAMAZAKI et al. '471 does not teach a multi-level conductive structure including a TiN film located at a top of the structure, an Al-based film located below the TiN film, and at least one Ti film

located at at least one of an upper position and a lower position with respect to the Al-based film as recited in claim 12 of the present application. As set forth above, YAMAZAKI et al. '632, YAMAZAKI et al. '822, KANEKO et al. and OHKAWARA et al. do not teach or suggest these features. Accordingly, the combination of references would not render obvious claims 12-21.

Claims 22-34 are rejected as unpatentable over YAMAZAKI et al. '632 in view of MURAKAMI et al. and further in view of YAMAZAKI et al. '822 and YAMAMOTO et al. 6,226,059 and still further in view of OHKAWARA et al. This rejection is respectfully traversed.

Claim 22 also provides a first multi-level conductive structure including a TiN film located at a top of the structure, an Al-based film located below the TiN film and at least one Ti film located at at least one of an upper position and a lower position with respect to the Al-based film. Claim 22 also provides that the TiN film of the first multi-level conductive structure has a nitrogen concentration of 25 atomic % or higher. As set forth above regarding claim 1, YAMAZAKI et al. '632 in view of MURAKAMI et al. and further in view of YAMAZAKI et al. '822 and OHKAWARA et al. do not disclose or suggest these features.

YAMAMOTO et al. is cited for the teaching of the recited scanning line. Specifically, the scan line as recited in

claim 22 is connected to a corresponding gate electrode and has a first multi-level conductive structure including a TiN film located at a top of the structure, an Al-based film located below the TiN film and at least one Ti film located at at least one of an upper position and a lower position with respect to the Al-based film, the TiN film with the first multi-level conductive structure having a nitrogen concentration of 25 atomic % or higher.

Applicants are unable to discern any of these teachings in YAMAMOTO et al. Specifically, column 2, lines 27-29 of YAMAMOTO et al. disclose that Al-Ti is used as a material of the gate electrode. There is no disclosure of a TiN film as part of a multi-level conductive structure. Accordingly, there could be no teaching of a TiN film of the first multi-level conductive structure having a nitrogen concentration of 25 atomic % or higher as recited in claim 22. As set forth above, these features are lacking in YAMAZAKI et al. '632, MURAKAMI et al., YAMAZAKI et al. '822 and OHKAWARA et al. Accordingly, the above combination of references would not render obvious claims 22-34.

Claims 35-53 are rejected as unpatentable over YAMAZAKI et al. '632 in view of MURAKAMI et al. and further in view of YAMAZAKI et al. '822 and YAMAMOTO et al. and still further in view of OHKAWARA et al. 6,249,325. This rejection is respectfully traversed.

OHKAWARA et al. is only cited for the teaching of a common line.

A common electrode and a common line are recited in claim 36 of the present application which depends from independent claim 35. A common line or a common electrode is not recited in independent claim 35.

In any event, claim 36 provides that the common electrodes and common line have the first multi-level conductive structure including a TiN film located at a top of the structure, an Al-based film located below the TiN film and at least one Ti film located at at least one of an upper position and a lower position with respect to the Al-based film and the TiN film of the first multi-level conductive structure has a nitrogen concentration of 25 atomic % or higher.

Applicants have thoroughly reviewed OHKAWARA et al. '325 and do not discern any teaching or suggestion of a titanium nitride film. Accordingly, there could not be any titanium nitride film having a nitrogen concentration of 25 atomic % or higher. Therefore, there could not be a common line that has the first multi-level conductive structure as recited in claims 35 and 36 of the present application. As set forth above, YAMAZAKI et al. '632, MURAKAMI et al., YAMAZAKI et al. '822 and YAMAMOTO et al. do not teach or suggest these features. Accordingly, the

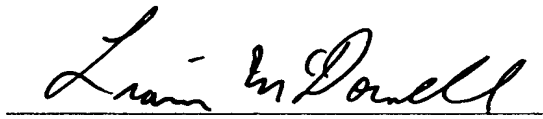
proposed combination of references would not render obvious claims 35-53.

In view of the foregoing Remarks, it is believed that the present application is in condition for allowance. Reconsideration and allowance are respectfully requested.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

YOUNG & THOMPSON



Liam McDowell, Reg. No. 44,231

745 South 23rd Street
Arlington, VA 22202
Telephone (703) 521-2297

LM/fb